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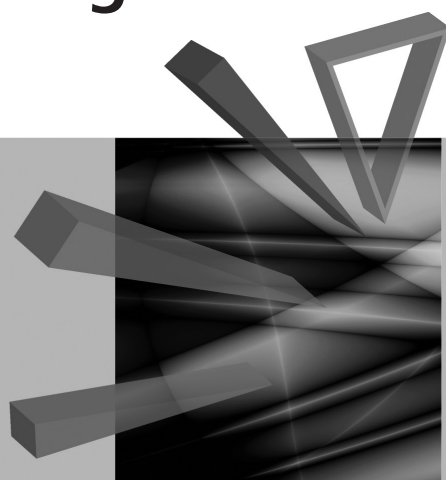
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# **Innovation as a Factor of the Development of the Asia-Pacific Region**



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## **INNOVATIVENESS AND DEVELOPMENT IN THE ECONOMIES OF JAPAN, KOREA AND CHINA. A COMPARATIVE APPROACH**

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**Summary:** China, Japan and Korea represent different levels of economic development although only China is in a different group of incomes and at a different stage of development. All are innovative and specialise in the same type of production, which makes cooperation in the area of innovation possible and desirable. All three economies demonstrated a relatively good adaptability after the 2007/2008 crisis. The author argues that the three economies have a big potential to cooperate in the area of innovation production, rooted in similar patterns of specialisation and high rankings of innovativeness. Nevertheless, this potential is not fully used. The full use of the potential is conditioned by the fulfillment of a number political decisions (the creation of a free trade area, cooperation in supporting R+D, more confidence building measures evidenced by the reduction of military potentials).

**Keywords:** innovativeness, economic development, Japan, Korea, China.

### **1. Introduction**

The 2007/08 crisis proved a relatively better immunity of the Asian economies in comparison with the European or American markets. Nevertheless, there are some differences in the symptoms, reactions as well as consequences of the crisis in individual Asian markets. The paper argues that these differences result from the level of development of Asian economies and their engagement in innovative production. This assumption will be proven by an examination of some of the features which characterise the current stage of development in three Asian economies: Japanese, Korean and Chinese. Despite those differences, the three economies specialise in similar types of production, which creates advantageous conditions for their cooperation in the future. Such cooperation could result in an increased innovativeness of the three economies, but existing opportunities are not utilised to the full in this area.

## 2. The evaluation of the economic climate in the three economies in question: China, Japan and Korea

Some of the indicators are similar in the three economies, while others differ (see Table 1). The unemployment rate is similar and relatively low in all of the studied economies. The rate of growth differs, reaching the highest level in China, relatively high in South Korea and medium but positive in Japan. All the indicators show that the three economies represent different levels of development. Japan with zero inflation indicates a process of deep desindustrialisation. China still increases its GDP by the growth of manufactured production. Korea moves its economy slowly from the industrial phase towards a phase closer to service-oriented production. The differences in this area are reflected by the differences in the rate of growth of prices. Japan experiences a zero rate of growth of prices, while China and South Korea both experience medium dynamics of prices increases. All three economies are strongly engaged in exports, which is reflected by a current account surplus.

**Table 1.** Macrostabilisation indicators

Country/ Indicator	Real GDP			Consumer prices			Current account			Unemployment		
	2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
China	9.2	8.2	8.8	5.4	3.3	3.0	2.8	2.3	2.6	4.0	4.0	4.0
Japan	-0.7	2.0	1.7	-0.3	0.0	0.0	2.0	2.2	2.7	4.5	4.5	4.4
Korea	3.6	3.5	4.0	4.0	3.4	3.2	2.4	1.9	1.5	3.4	3.3	3.3

Source: *World Economic Outlook. Growth Resuming, Dangers Remain*, World Economic and Financial Surveys, IMF, April 2012, p. 61.

The ranking of the public debt of the three states puts South Korea and China in a comfortable position, while Japan exceeds the internationally approved indicator of 60% of GDP by nearly four times, reaching 225.8% of its GDP. In China the indicator is 17.50%, while in South Korea 23.70%. The size of the public debt in each of the states in question results from the outcome of their budgets. In the case of China, the share of the budget deficit in the GDP is -1.2%, in the case of South Korea there is a surplus amounting to +2.2%. In the case of Japan it is -8.9%.<sup>1</sup> The costs of servicing the debt in Japan, the bubble burst in the late 1980s and recently the earthquake and tsunami damaging the Fukushima atom power plant all can be put together adding up into climbing steeply budget deficit, which is followed by the public debt.

Generally, the macrostabilisation climate in the three states differs, which is followed by deep differences in the production of R+D, the imports of licenses and their utilisation. This problem is discussed in the following parts of the study. The

<sup>1</sup> *Global Financial Stability Report. The Quest for Lasting Stability*, IMF, Washington, April 2012, p. 23.

three economies differ also as far as competitiveness is concerned. Japan achieved the 9th position in 2011/2012 (the 9th in 2010/2011 and the 6th in 2009/2010), Korea respectively is in the 24th position (the 24th in the last report and the 22nd in the former one). China achieved in 2011/2012 the 26th position (the 26th in 2011/2010 and the 27th in 2009/2010). The three economies are at different stages of development. Japan and Korea are at the highest third stage of development, while China is at the second stage of its development, according to the evaluation carried by the World Economic Forum.<sup>2</sup>

All the enumerated features have an impact (directly and indirectly) on the abilities of an economy to create innovations, participate in international transfers as the seller or buyer, gain in terms of exports and absorption of advanced technologies and innovations.

### 3. Measuring innovativeness in the economies under study

The scores representing the innovativeness of the three economies are not so much varied as the scores which were presented in the previous part of the analysis (see Table 2). This shows that economies, when they make an effort, can catch up on development quicker than it was expected in the past. The convergence in the innovation scores of the three economies results from two trends which were observed in parallel to one another. On the one hand, the economies of the states representing a higher level of development experienced a specific slowdown and regress or fall in rankings, while the catching up economies, despite some slowdown in their rates of growth, still have continued with growth at relatively high rates.

**Table 2.** Innovation score in China, Japan and Korea in 2011, against the background of 2009–2010

Country/contents	China		Japan		Korea	
Ranking	46.4		50.3		53.0	
Score	29		20		16	
	Score	Ranking	Score	Ranking	Score	Ranking
Innovation output sub-index	46.8	14	41.3	26	47.9	11
Innovation input sub-index	46.1	43	59.3	18	59.4	17
Innovation efficiency index	1.0	3	0.7	64	0.8	25
Global innovation index 2010	43		13		20	
Global innovation index 2009	37		9		6	

Source: *The Global Innovation Index*, World Economic Forum, Geneva 2011.

Japan is more advanced in economic structural changes and, in comparison with the remaining two countries analysed in this study, enjoys a higher share of copy-

<sup>2</sup> K. Schwab, *Global Competitiveness Report*, Geneva 2012, p. 13.

right-based industries in the GDP and employment than China and South Korea (see Table 3). In the case of the two remaining economies, the figures differ but are comparable and reflect differences in the stages of their development. China seems to be less effective in comparison to South Korea as far as the shares of employment and GDP are compared in both cases. The Japanese example shows a much higher advancement in this specific field.

Studies indicate that there are a number of areas in which innovations are concentrated. Those are automobile construction and technologies, computing and decimal technologies and health. In all three areas Japan plays a leading role on a world scale. Also a number of Japanese companies are listed among the most innovative ones, which is measured by the number of the licenses of new technologies which are registered and applied in production.

**Table 3.** Economic contribution of copyright-based industries

Country	Contribution to GDP in %	Contribution to employment %
China	6.41	6.50
Japan*	28.1	36.0
Korea	8.67	4.31

\* Asian economy: Japan's economy by sector. M. Yashimoto, *The Status of Creative Industries in Japan and Policy Recommendations for Their Promotion*, Social Development Research Group, Tokyo NLI Research Institute, Tokyo 2003.

Source: WIPO 2012 Report.

In all three economies the contribution of copyright industries to GDP and employment is higher than the average for the world economy. Nevertheless, the two indicators are relatively higher in Japan than in China and Korea. The comparisons between China and Korea show that in China the indicator of copyright industries as a share in job creation is relatively higher, while in Korea it is higher as a share of GDP. This finding leads to a conclusion that the Chinese results in copyright industries are achieved by mass effort in this area, which leads to assuming a relatively low effectiveness of this specific sector, where achievements result from a massive engagement in this area. In Korea the situation is different and can be a result of qualitative effect in this area. The comparisons between the three economies lead to a conclusion that China can take a lead in copyright industries due to quantitative engagement, enabled by low costs of specialists working in this area. Nevertheless, the openness of the economy will be followed by the migration of specialists if their earnings will continue to be low. In such circumstances the potential advantages of this economy can be lost. On the top of that, the Chinese economy is at a lower level of development in comparison with Japan and Korea. This implies a more effective approach to productivity also in the area of innovation. It seems that at this stage of development the copyright industries are characterised by a relatively high dyna-



mics, which stems from a low level from which they start. Having said that, it is very difficult to foresee the results of applied policies in this area by the three economies under study. The noted trend can continue in the future, but also it can lead towards dramatic changes in the rankings, bringing China to the leader position. An attempt to prognose the future trend in this field would remind a witch-teller vision.

This specific area is strongly dependent on readiness to work in international networks, including openness of copyright industries and their workers, followed by cultural preparedness, appropriate skills and language abilities to communicate and absorb knowledge. In this specific area the three economies differ enormously (see Table 4).

**Table 4.** Network readiness index in 2011–2012 and 2010–2009

Country/ Contents	2010–2011				2009–2010	
	Rank	Score	Income level	Position in Group	Rank	Score
China	36	4.35	LM	1	37	4.31
Japan	19	4.95	HI	19	21	4.89
Korea	10	5.10	HI	10	15	5.14

HI – high income

LM – lower-middle income

The classification of incomes from the World Bank, December 2010.

Source: *The Global Information Report*, World Economic Forum 2011, p. 12.

The data indicates that Korea represents the highest readiness to cooperate internationally. The country's rankings exceed the Japanese one. The comparisons between Korea and Japan are made within one category of income, which is high in comparison to China, where incomes are lower-medium. The levels of income can have an impact on changes of the readiness networking rankings, and it is difficult to predict their results in advance. They can both stimulate China to improve the index or work in the opposite direction, when salaries will not grow catching up with other economies. At this stage, we can observe a great effort in China to change the ability of R+D staff to cooperate with foreigners. The results here are difficult to foresee, especially when the international environment in this area goes through a deep change as well. This means that the future ranking will include changes in the individual economies in this specific area, which will be followed by the process of internationalisation of R+D. The second process will not be limited to geographical regions but will be structured on a world scale. Such trends are already noted in most of the studies analysing the process of outsourcing and the international division of labour, and it can be expected that this process will continue. The internationalisation of production and research increases the difficulties in making comparisons referring to national economies. In other words, we continue to evaluate economies using national statistics, while the economies are international and this trend is on the increase.

The three economies in question show different levels of the dynamics of the development of their innovation abilities and potential. While Japan has been developing its innovativeness steadily since the 1970s, reaching a leading international position in this field, Korea started later and employed a rapid catch-up strategy in this field resulting in high dynamics of this process and a relatively high position in a shorter time than Japan. China had a still shorter time to increase its own innovation capacities and the dynamics of the process was higher than in the case of Korea. The three economies watching regional performance in this specific field found that a closer cooperation in the region can be fruitful.<sup>3</sup>

#### **4. Innovativeness as a factor of growth in the three economies**

Recently a number of states have focused on enhancing the innovation potentials as one of the leading drivers of their development and growth strategies. This is followed by a number of policies which are applied by individual governments in those states. The policies embrace such areas as education, research and development, institutional protection of innovations, stimulation of international ties, which result in building innovation capabilities.<sup>4</sup> The weight of innovation in public policies is on the rise. Technologies' costs often exceed the abilities to finance them by a single company as it was practiced in the past, when companies had their own laboratories able to provide necessary technologies for the technological upgrading of their production. Innovation was not the main driver of competitiveness as well as growth. Currently – when the competition has intensified with the opening of national economies and production has been carried out by TNC as well as small and medium enterprises (SMEs), when innovation has become one of the main components of growth strategies and the costs of technologies have been on the rise – companies have started to cooperate not only within one national market but also with companies outside their own market. This is caused by increasing costs of financing R+D as well as by changes in the approach to rivalry and cooperation. The two opposing (in the past) approaches to competing companies brought a new approach which is labelled “cooperative competition”, called often “co-opetition”.<sup>5</sup>

The goal of increasing the role of knowledge-based economy in growth strategies enforces a new approach to the cooperation in this field among states as well as companies located in those states. Such cooperation increases the effectiveness of the use of financing means as well as the findings achieved within such cooperation programmes. Finally, such a strategy enhances the competitiveness of cooperating

<sup>3</sup> K. Nabeshima, K. Tanaka, *Innovation Networks in China, Japan and Korea: Further Evidence from U.S. Patent Data*, Discussion Paper 297, Institute of Developing Economies, Chiba, Japan, April 2011.

<sup>4</sup> *Building Knowledge Economies*, World Bank Institute, World Bank, Washington D.C. 2007.

<sup>5</sup> A. Brandenburger, B. Nalebuff, *Co-opetition. A Revolutionary Mindset that Combines Competition and Cooperation*, Currency Doubleday, 1997.

parties *vis-à-vis* their competitors from the outside of such a cooperative agreement. There are a number of studies which look into the cooperation in R+D or common patent registration, which helps to quantify the innovativeness of cooperating states. The available data indicates that the three economies in question, namely China, Japan and Korea, are the most frequently engaged economies from Asia, which closely cooperate in the field of innovativeness. As already presented, the three economies play an important role on the world innovation market. Japan and Korea are leaders in Northeast Asia in this area, while China is quickly catching up here. According to K. Nabeshima and K. Tanaka, the cooperation among the three economies can become an engine of the world innovation technology. If, on the top of that, three additional conditions are fulfilled, the markets in question could increase their innovativeness position. Those conditions are the following:

- 1) creation of a free trade area among the three markets, which is currently being discussed;
- 2) financial support from the state budget and capital market;
- 3) military and security agreement resulting in the reduction of military expenditures in the region.

The three markets can provide “fertile grounds” for the development of knowledge networks when all of the mentioned conditions are met fully or partially.<sup>6</sup> The aforementioned conditions can be fulfilled, but it seems that they require a wider approach to the problem, going beyond the regional solutions and agreements. This means that a global or at least subregional agreement is needed here. The expansion of outsourcing in production paves the path for such solutions, but they are still far from being achieved. Outsourcing and international capital flows pave the way for regional, subregional and global liberalisation. Nevertheless, all those processes require an approval of the nations, which further has to be followed by long-lasting negotiations in which all national doubts and interests have to be taken into account. Moreover, the liberalisation of trade seems to be an easier task in comparison to security agreements in the region. This is so not necessarily in the case of relations between the three states in question, but in a wider context, which takes into account tensions between North and South Korea, China and Taiwan, Japan and Russia, etc.

One can compare this “possible” technological potential with the abilities to use all the potential that is available in Europe in this area although it is co-financed by the money from the framework programmes. In the EU the money is used to finance R+D projects following the guidelines for research which are given by the current strategy Europe 2020, which has replaced the Lisbon Strategy of 2000. What can be seen here? On the one hand, the financing is sufficient to lead to awaited research results and findings, the human and scientific potential is there, people are able to communicate and represent the same geographic culture circle but, on the other hand, the results are limited. They are much better in the US than in the EU. In

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<sup>6</sup> K. Nabeshima, K. Tanaka, *op. cit.*

the EU the results are on average not as good as in the case of the individual states in Asia. Perhaps patents registered by Germany are breaking this stereotype but, at the same time, the citation index of German scholars is limited in comparison with the indexes of American scholars or those from Asia.

This brings us to one of the findings that companies from different economies cooperate, but this is still a limited cooperation. This will also happen in the case of the three Asian economies, especially when we see how far they are in fulfilling the three mentioned conditions, which would be helpful for them to cooperate closer. The solution here lies in a closer cooperation achieved by capital flows, scholars' exchanges, internationalisation of companies and trade liberalisation. All this would lead towards more confidence building in the region, which should be followed by the normalisation of relations in the pairs of divided countries, which became officially hostile.

There is clearly a number of fields in which the cooperation among China, Japan and Korea can be fruitful, leading to a more effective use of resources and finally helping to upgrade technologies, make new outstanding findings and increase the rates of growth, but this can be done only in the case of overcoming the security constraints, which still matter in the region. The relatively high position of China is often ascribed to the patents which are registered by Hong Kong and Taiwan. Nevertheless, looking at the list of places which are considered to be innovation cities, limiting them only to Asia, the presence of cities from the three analysed economies is relatively high. This fact is not surprising. The list embraces 162 cities among which Hong Kong has the 15th position, Melbourne – the 17th, Sydney – the 20th, Tokyo – the 22nd, Shanghai – the 24th, Singapore – the 26th, Seoul – the 28th, Kyoto – the 30th, Osaka – the 48th, Beijing – the 53rd, Wellington (NZ) – the 61st, Fukuoka – the 66th, Kuala Lumpur (Malaysia) – the 67th, Auckland (New Zealand) – the 70th, Kobe (Japan) – the 85th, Shenzhen (Huangdong) – the 93rd.

The patent registration in the three states in question shows that the economies specialise in similar areas, which increases their ability for a closer cooperation. Those specialisation areas cover: precise instruments, electronic circuits, telecommunication equipment, semiconductors, display, sound and information memory, clock, controlling calculator, optics, photography, data storage and processing, transportation and automobiles. This leads to the indication of the five main areas in which cooperation would be effective and successful.

As far as citations are concerned, the trends in this field are different. No Korean citations are noted in Chinese works; Chinese patents predominantly cite US patents, more seldom they quote Chinese, Korean or Japanese ones. This leads us to a finding that the mutual component of the citation pattern in the three countries is quoting the US patterns. Trying to find how often Chinese, Japanese and Korean patents are quoted outside those countries, we find that the citations form here a similar share, which does not help us to find a clear leader in the group according to these specific criteria. The outside citation index for the three economies is similar, reaching 20%,

which in a way can be explained by limited access to patents, which are presented in one of the local languages. Nevertheless, the figures of migrations, on the one hand, among the mentioned three states and, on the other hand, abroad, eliminate partly the barrier which is created by language.

Northeast Asian economies try to institutionalise their cooperation, which is achieved among others in the Northeast Asia Standard Cooperation Forum. This helps to create a more open approach to “innovation”. Their similar pattern of innovative specialisation forms a good ground for cooperation. This is followed by a growing role of knowledge and innovation in growth and competitiveness, which implies an upgraded role of technologies in production and trade.

## 5. Conclusions

The three Asian economies compared in the study represent different levels of development despite the fact that the indicators of their innovativeness are high. All three specialise in similar types of production. Nevertheless, the cooperation between them is limited. The readiness for networking is also varied. The crisis has lowered their rate of growth and led to high public debt in Japan, whose economy represents the highest level of development in the studied group of states. Naturally created potential which can bring the three economies to closer cooperation has not been used to the full so far. The crisis of 2007/2008 also did not bring the three economies towards a closer cooperation. Despite relatively high rankings in innovativeness, all three countries do not rely on technologies developed in the region. Primary technology used in production comes traditionally from the US or some other developed economy. All three economies indicate a high citation index of American technologies and licenses, which seems to be a common denominator. It seems that the cooperation among China, Japan and Korea can be established much easier with the participation of some external markets, like the EU, the US or at least Australia and New Zealand. The situation may change with the creation of a free trade zone in the region, which is being negotiated. The liberalisation of trade in the region, supported by regional policies stimulating R+D cooperation can bring a revolution in the cooperation among the three economies influencing strongly their innovativeness.

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## INNOWACYJNOŚĆ I ROZWÓJ GOSPODARCZY W CHINACH, JAPONII I KOREI. PODEJŚCIE PORÓWNAWCZE

**Streszczenie:** Chiny, Japonia i Korea reprezentują zróżnicowane poziomy rozwoju gospodarczego, choć tylko Chiny są gospodarką, która jest zaliczana do innej grupy dochodowej. Wszystkie trzy gospodarki uznawane są za innowacyjne i specjalizują się w podobnych rodzajach produkcji, co sprzyja kooperacji między nimi w dziedzinie tworzenia innowacji. Gospodarki wykazały duży stopień adaptacyjności po kryzysie 2007/2008. Trzy gospodarki mają potencjał, który może być wykorzystany w tworzeniu innowacji. Zróżnicowanie rozwoju uważa się za czynnik sprzyjający współpracy, jednak jej rozwój wymaga decyzji (liberalizacji handlu, wspólnego wspierania badań rozwojowych oraz podjęcia działań tworzących środki wzajemnego zaufania). Elementem ważnym dla takich działań byłoby m.in. zredukowanie potencjału wojskowego w regionie.

**Słowa kluczowe:** innowacyjność, rozwój gospodarczy, Chiny, Japonia, Korea.